

## PATENT COOPERATION TREATY

## PCT

## INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

REC'D 0.5 DEC 2005

WIPO

PCT

Applicant's or agent's file reference 206,569-PCT	FOR FURTHER ACTION		See Form PCT/IPEA/416
International application No. PCT/US04/23122	International filing date (day/month/year) 16 July 2004 (16.07.2004)	Priority date (day/month/year) 17 July 2003 (17.07.2003)	
International Patent Classification (IPC) or national classification and IPC IPC(7): B63B 25/08, 25/12 and US Cl.: 114/74R, 74A			
Applicant SAUDI ARABIAN OIL COMPANY			
<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of <u>5</u> sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input checked="" type="checkbox"/> (sent to the applicant and to the International Bureau) a total of <u>5</u> sheets, as follows:</p> <p><input type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p>b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) _____, containing a sequence listing and/or tables related thereto, in electronic form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p> <p>4. This report contains indications relating to the following items:</p> <p><input checked="" type="checkbox"/> Box No. I Basis of the report</p> <p><input type="checkbox"/> Box No. II Priority</p> <p><input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p><input type="checkbox"/> Box No. IV Lack of unity of invention</p> <p><input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p><input type="checkbox"/> Box No. VI Certain documents cited</p> <p><input type="checkbox"/> Box No. VII Certain defects in the international application</p> <p><input type="checkbox"/> Box No. VIII Certain observations on the international application</p>			
Date of submission of the demand 27 January 2005 (27.01.2005)		Date of completion of this report 15 November 2005 (15.11.2005)	
Name and mailing address of the IPEA/ US Mail Stop PCT, Attn: IPEA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (571) 273-3201		Authorized officer <i>S. Wildermuth</i> Sherman D. Basinger Telephone No. 571-272-3600	

Form PCT/IPEA/409 (cover sheet)(April 2005)

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/US04/23122

Box No. I Basis of the report

1. With regard to the language, this report is based on:

- ☒ the international application in the language in which it was filed.
- ☐ a translation of the international application into English, which is the language of a translation furnished for the purposes of:
- ☐ international search (under Rules 12.3 and 23.1(b))
- ☐ publication of the international application (under Rule 12.4(a))
- ☐ international preliminary examination (under Rules 55.2(a) and/or 55.3(a))

2. With regard to the elements of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

- ☐ the international application as originally filed/furnished
- ☒ the description:  
 pages 1-14 as originally filed/furnished  
 pages\* NONE received by this Authority on \_\_\_\_\_  
 pages\* NONE received by this Authority on \_\_\_\_\_
- ☒ the claims:  
 pages NONE as originally filed/furnished  
 pages\* NONE as amended (together with any statement) under Article 19  
 pages\* 15-19 received by this Authority on 14 September 2005 (14.09.2005)  
 pages\* NONE received by this Authority on \_\_\_\_\_
- ☒ the drawings:  
 pages 1-9 as originally filed/furnished  
 pages\* NONE received by this Authority on \_\_\_\_\_  
 pages\* NONE received by this Authority on \_\_\_\_\_
- ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing.

3. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages \_\_\_\_\_
- ☐ the claims, Nos. \_\_\_\_\_
- ☐ the drawings, sheets/figs \_\_\_\_\_
- ☐ the sequence listing (*specify*): \_\_\_\_\_
- ☐ any table(s) related to the sequence listing (*specify*): \_\_\_\_\_

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

- ☐ the description, pages \_\_\_\_\_
- ☐ the claims, Nos. \_\_\_\_\_
- ☐ the drawings, sheets/figs \_\_\_\_\_
- ☐ the sequence listing (*specify*): \_\_\_\_\_
- ☐ any table(s) related to the sequence listing (*specify*): \_\_\_\_\_

\* If item 4 applies, some or all of those sheets may be marked "superseded."

# INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.  
PCT/US04/23122

**Box No. V** Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

## 1. Statement

Novelty (N)	Claims <u>3-5, 7-20 and 26</u>	YES
	Claims <u>1, 2, 6 and 21-25</u>	NO
Inventive Step (IS)	Claims <u>NONE</u>	YES
	Claims <u>1-26</u>	NO
Industrial Applicability (IA)	Claims <u>1-26</u>	YES
	Claims <u>NONE</u>	NO

## 2. Citations and Explanations (Rule 70.7) Please See Continuation Sheet

## Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of:

#### V. 2. Citations and Explanations:

Claims 1, 2, 6 and 21-25 lack novelty under PCT Article 33(2) as being anticipated by Wasenius. The vessel with the plurality of separate liquid cargo tanks is shown in figures 1a and 1b. That the tanks 2 are located below the deck plate is shown in figure 8. That middle tanks 2 have a highest point above the baseline of the ship is shown in figure 2. That a portion of the deck plate is located above each tank and each tank has a highest point available above the baseline of the ship is shown in figure 8. The plurality of apertures or slots in the deck plate communicating with the respective tank there below is shown by the broken lines at the lower end of expansion trunk 10 as is shown in figure 2. Trunk 10 is secured in liquid tight relation with the deck plate and surrounds the plurality of apertures in the deck plate above each tank as is shown in figure 2. Since trunk 10 of the middle tanks in figure 8 is located at the highest point of the tank above the baseline of the ship, the apertures would likewise be located as such. The trunk is in communication with pipelines 8 and 11 for venting the tank.

Figure 2 shows that the trunks 10 are located as far forward as is possible with respect to the tanks. The apertures in the deck are inherently positioned in either one or more than one of the deck plates.

Claim 21 lacks novelty under PCT Article 33(2) as being anticipated by Jack. The trunk is 19 and the vent pipeline is clearly shown in figure 2 at the top of the trunk 19.

Claims 3-5, 7-13, 16-20 and 26 lack an inventive step under PCT Article 33(3) as being obvious over Wasenius. Wasenius does not disclose that the slots have a sufficient area such that there is approximately less than a 0.5 pound per square inch pressure difference between the opposing tank side and trunk side of the deck plates when the tank is being loaded at 200% of its maximum load, that the slots are between 2 and 3 centimeters wide and one half of the length of a deck plate, that the trunk 10 has an interior volume of at least 2% of the volume of the respective tank there below for liquid cargo storage, that the apertures are located as far aft on the tank as is possible, that the trunk has dimensions of between about 10-40 meters in length, about 5-15 meters wide and about 2-3 meters high, that the trunk encloses a volume at least that required for compliance with maritime regulations for an expansion space for liquid cargo storage, that the expansion space of each trunk for fluid cargo storage is at least about 2% of the amount of under deck space for use as fluid cargo storage, and that the slots are at least one half the length of the deck plate.

However, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains to modify the trunks and apertures or slots of Wasenius such that the slots have a sufficient area such that there is approximately less than a 0.5 pound per square inch pressure difference between the opposing tank side and trunk side of the deck plates when the tank is being loaded at 200% of its maximum load, that the slots are between 2 and 3 centimeters wide and one half of the

## Supplemental Box

length of a deck plate, that the trunk 10 has an interior volume of at least 2% of the volume of the respective tank there below for liquid cargo storage, that the apertures are located as far aft on the tank as is possible, that the trunk has dimensions of between about 10-40 meters in length, about 5-15 meters wide and about 2-3 meters high, that the trunk encloses a volume at least that required for compliance with maritime regulations for an expansion space for liquid cargo storage, that the expansion space of each trunk for fluid cargo storage is at least about 2% of the amount of under deck space for use as fluid cargo storage, and that the slots are at least one half the length of the deck plate. Motivation to make these modifications are found in the fact that the apertures and trunk are going to be made a dimension and volume to meet any requirements specified by a governing body so that the vessel can be used for what it is intended.

With regard to claim 20, the alternative vent line will be the line with valve 13 therein.

With regard to claim 26, Wasenius does not disclose at least two separate expansion trunks 10 positioned on the deck plate and over the apertures. This limitation is met if each tank 2a and 2b is provided with two sets of apertures in the deck plate above each tank and a trunk 10 for each set of apertures as opposed to having only one set of apertures with one trunk for this set of apertures. It would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains to provide two sets of apertures for each tank 2a, 2b of Wasenius with a trunk 10 positioned over each set of apertures. Motivation to do so is to provide two tank hatches 10 to be filled as described in the abstract of Wasenius. More oil can be carried and yet the necessary under pressure can still be maintained.

Claims 14 and 15 lack an inventive step under PCT Article 33(3) as being obvious over Wasenius in view of Butterworth. Wasenius does not disclose that trunk 10 include a crude oil washing pipeline and is configured for being connected with one or more removable crude oil washing machines or a permanently installed crude oil pipeline washing machine. Butterworth discloses that trunk 5 includes crude oil washing pipeline 12 and that the trunk 5 is configured for being connected with removable crude oil washing machine 7. It would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains to modify trunk 10 of Wasenius to such that it includes a crude oil washing pipeline similar to 12 of Butterworth and is configured for being connected with one or more removable crude oil washing machines similar to 7 of Butterworth or a permanently installed crude oil pipeline washing machine. Motivation to do so is to provide means to clean and scale the tanks 2 of Wasenius. With regard to claim 15, see the trunks 10 shown in figure 2 of Wasenius.

Claims 1-26 meet the criteria set out in PCT Article 33(4), and thus have industrial applicability because the subject matter claimed can be made or used in industry.

## CLAIMS

What is claimed is:

1. A marine vessel having a plurality of separate liquid cargo tanks located below the deck plate, the tanks having a generally highest point above the baseline of the ship, at least a portion of the deck plate being located above each tank and each tank having a highest point available above the baseline of the ship, the improvement which comprises a plurality of apertures in said deck plate communicating with the respective tank therebelow, said plurality of apertures being positioned substantially as close to the highest point of the tank above the baseline of the ship, and a separate expansion trunk positioned on said deck plate and over said apertures, said trunk being secured in liquid-tight relation with said deck plate and surrounding said plurality of apertures in said deck plate above each tank, to thereby form an expansion space to serve the liquid cargo in the respective tank therebelow, said expansion trunk being in liquid communication with pipelines for the venting of the tank.
2. The vessel according to claim 1, wherein each said expansion trunk is located directly above the respective tank therebelow and as far forward as possible.
3. The vessel according to claim 1, wherein said plurality of apertures are slots configured to provide openings having a sufficient area such that there is approximately less than a 0.5 pound per square inch pressure difference between the opposing tank side and trunk side of said deck plates when the tank is being loaded at 200% of its maximum load rate.

4. The vessel according to claim 2, wherein said slots are between approximately 2 and 3 centimeters wide and one half of the length of a deck plate.
5. The vessel according to claim 1, where each said expansion trunk has an interior volume of at least 2% of the volume of the respective tank therebelow for liquid cargo storage.
6. The vessel according to claim 1, wherein said apertures in the deck are positioned in one or more deck plates.
7. The vessel according to claim 1, wherein said apertures in said deck plate are located directly over each associated tank and as far aft on the tank as possible.
8. The vessel according to claim 1, wherein each said trunk has dimensions of between about 10 to 40 meters in length, about 5 to 15 meters wide and about 2 to 3 meters high.
9. A system for fluid storage for transport, which comprises a plurality of separate liquid cargo tanks located below a deck plate of a marine vessel, a portion of the deck plate located above each tank being provided with a plurality of apertures communicating with the tank therebelow, and a separate expansion trunk secured in liquid-tight relation with the deck plate and surrounding said plurality of apertures in the deck plate above each tank, to thereby form an expansion space to serve the liquid cargo in the tank therebelow, said expansion trunk including pipelines for venting the tank and enclosing a volume at least that required for compliance with maritime regulations for an expansion space for liquid cargo storage.

10. The system according to claim 9, wherein said expansion space of each said expansion trunk for liquid cargo storage is at least about 2% of the amount of under deck space for use as liquid cargo storage.

11. The system according to claim 9, wherein each said expansion trunk is located directly above the associated tank and as far forward as possible.

12. The system according to claim 9, wherein each said expansion trunk is located directly above the associated tank and as far aft as possible.

13. The system according to claim 9, where each said expansion trunk is located at the highest point in the associated tank above the baseline of the vessel.

14. The system according to claim 9, wherein each said expansion trunk includes a crude oil washing pipeline and is configured for being connected with one or more of a removable crude oil washing machine or a permanently installed crude oil pipeline washing machine.

15. The system according to claim 14, wherein each said expansion trunk includes at least one side wall and a top wall, said side wall and top wall each having inner sides, said inner sides being at least substantially free from one or more primary structural members of said trunk.

16. The system according to claim 9, wherein said apertures are elongated slots which are configured such that there is approximately less than a 0.5 pound per square inch pressure difference between the opposing tank side and trunk side of the deck plates when the tank is being loaded at 200% of its maximum load rate.

17. The system according to claim 16, wherein said slots which are approximately between 2 and 3 centimeters wide.

18. The system according to claim 16, wherein said slots are approximately one half of the length of a deck plate.



19. The system according to claim 9, wherein said trunk has dimensions of between about 10 to 40 meters in length, about 5 to 15 meters wide and about 2 to 3 meters high.

20. The system according to claim 9, wherein each said trunk includes an alternative vent line and the associated tank has a highest point in the tank above the baseline of the ship, said alternative vent line being in liquid communication with the highest point in the tank above the baseline of the ship.

21. A marine vessel comprising a plurality of liquid cargo tanks located below deck plates of a deck, and each tank having a portion of deck plate as a highest point above the baseline of the ship, which comprises:

a plurality of trunks positioned on the respective deck plates, the portion of the tank located at the highest point above the baseline of the ship being in liquid communication with each said trunk, and said each said trunk being secured in liquid-tight relation with the deck plate above each said associated tank, to thereby form an expansion space to serve the liquid cargo in the tank therebelow, each said expansion trunk being in liquid communication with pipelines for the venting of the tank.

22. The marine vessel according to claim 21 wherein each said trunk is located above a portion of the tank located at the highest point above the baseline of the vessel, the portion of the tank above the highest point including one or more deck plates, the one or more deck plates having a plurality of elongated slots located within the periphery of said fluid-tight structure of said trunk and deck plates, and in liquid communication with said tank.

23. The marine vessel according to claim 21 wherein each said trunk is located above a portion of the tank, the portion of the tank above the highest point

thereof including an alternative vent line being in liquid communication with said trunk and said trunk being in liquid communication with the tank through a plurality of elongated slots in the associated deck plates beneath said trunk.

24. A marine vessel having a plurality of separate liquid cargo tanks located below the deck plate, the tanks having a generally highest point above the baseline of the ship, at least a portion of the deck plate being located above each tank and as close as possible to the highest point above the baseline of the ship, the improvement which comprises a plurality of apertures communicating with the tank below, and a separate expansion trunk secured in liquid-tight relation with said deckplate and surrounding said plurality of openings in the deck plate above each tank, to thereby form an expansion space to serve the cargo in the tank below.

25. The vessel according to claim 24, where each said expansion trunk is positioned above the forward portion of the tank.

26. A marine vessel having a plurality of separate cargo tanks located below the deck plate, the tanks having a generally highest point above the baseline of the ship, at least a portion of the deck plate being located above each tank and each tank having a highest point available above the baseline of the ship, the improvement which comprises a plurality of apertures in said deck plate communicating with the respective tank therebelow, said plurality of apertures being positioned substantially as close to the highest point of the tank above the baseline of the ship, and at least two separate expansion trunks positioned on said deck plate and over said apertures, said trunks being secured in liquid-tight relation with said deck plate and surrounding said plurality of apertures in said deck plate above each tank, to thereby form expansion space to serve the liquid cargo in the respective tank therebelow, said expansion trunks being in liquid communication with pipelines for the venting of the tank.